

What is claimed is:

1. A method for anchoring a heat spreader of a Plastic Ball Grid Array (PBGA) package to the surface of an underlying substrate of the PBGA package, comprising the steps of:

5 (a) providing a substrate for a PBGA package, said substrate having been provided with heat spreader anchor posts over the surface thereof, said heat spreader anchor posts being separated by a first distance;

(b) providing a heat spreader for a PBGA package, said heat spreader comprising:

10 (i) a horizontal portion, being parallel with the surface of said substrate of said PBGA package;

(ii) heat spreader stand-off features;

(iii) said heat spreader stand-off features having a contact surface providing contact between said heat spreader and said substrate;

15 (iv) said contact surface of said heat spreader stand-off features having been provided with openings there-through; and

(v) said openings provided through said contact surfaces being separated by a distance of said first distance;

20 (c) aligning said anchor posts provided over the surface of said substrate with said openings provided through said contact surfaces of said stand-off features of said heat spreader; and

(d) inserting said anchor posts provided over the surface of said substrate into said openings provided through said contact surfaces of said stand-off features of said heat spreader, creating anchor posts protruding through said openings provided through said contact surfaces.

25 2. The method of claim 1, said anchor posts comprising deposits of thermally and electrically conductive material, said thermally and electrically conductive material having been cured after deposition thereof.

30 3. The method of claim 1, said anchor posts comprising a material selected from the group consisting of epoxy to which traces of silver have been added and solder paste and a solid metal.

4. The method of claim 1, said heat spreader having a first and a second surface, said first surface facing said substrate, said first surface having been provided with a layer of electrically non-conductive material.

5. The method of claim 4, said providing said first surface of said heat spreader with a layer of electrically non-conductive material comprising a method selected from the group consisting of coating and depositing and chemically treating the first surface of said heat spreader.

6. The method of claim 1, said anchor posts having been created applying methods is dispensing or printing of electrically and thermally conductive material.

7. The method of claim 6, said conductive material comprising epoxy to which traces of silver have been added.

8. The method of claim 1, said anchor posts having been created applying methods of solder bump or contact point creation.

9. The method of claim 1, with additional steps of:
depositing a layer of electrically and thermally conductive material over said anchor posts protruding through said openings provided through said contact surfaces, thereby including a surface area of said heat spreader surrounding said openings provided through said contact surfaces; and
curing said deposited layer of electrically and thermally conductive material.

10. The method of claim 9, said electrically and thermally conductive material comprising a material selected from the group consisting of epoxy to which traces of silver have been added and solder paste and a solid metal.

11. A method for creating a Plastic Ball Grid Array (PBGA) package, comprising the steps of:

(a) providing a PBGA substrate having points of electrical contact over the surface thereof, a layer of thermally conductive adhesive having been provided over the surface of said substrate, at least one semiconductor device having been positioned over the surface of said layer of thermally conductive adhesive using a die attach process, said positioning of said at least one semiconductor device being performed such that contact points provided in an active surface

of said at least one semiconductor device being exposed and facing away from the surface of said substrate;

(b) creating anchor posts over the surface of said substrate, said anchor posts being separated by a first distance;

5 (c) curing said created anchor posts;

(d) electrically connecting said contact points provided in an active surface of said at least one semiconductor device with said points of electrical contact provided over the surface of said substrate, using methods of wire bonding;

(e) providing a heat spreader for said PBGA package, said heat spreader comprising:

10 (i) a horizontal portion, being parallel with the surface of said substrate of said PBGA package;

(ii) heat spreader stand-off features;

(iii) said heat spreader stand-off features having a contact surface providing contact between said heat spreader and said substrate;

15 (iv) said contact surface of said heat spreader stand-off features having been provided with, openings there-through; and

(v) said openings provided through said contact surfaces being separated by a distance of said first distance;

20 (f) aligning said anchor posts provided over the surface of said substrate with said openings provided through said contact surfaces of said stand-off features of said heat spreader; and

25 (g) inserting said anchor posts provided over the surface of said substrate into said openings provided through said contact surfaces of said stand-off features of said heat spreader, creating anchor posts protruding through said openings provided through said contact surfaces.

12. The method of claim 11, said anchor posts being created during said die attach process.

13. The method of claim 11, said anchor posts comprising deposits of thermally and electrically conductive material.

30 14. The method of claim 11, said anchor posts comprising a material selected from the group consisting of epoxy to which traces of silver have been added and solder paste and a solid metal.

15. The method of claim 11, said heat spreader having a first and a second surface, said first surface facing said substrate, said first surface having been provided with a layer of electrically non-conductive material.

5 16. The method of claim 15, said providing said first surface of said heat spreader with a layer of electrically non-conductive material comprising a method selected from the group consisting of coating and depositing and chemically treating the first surface of said heat spreader.

17. The method of claim 11, said anchor posts having been created applying methods is dispensing or printing of electrically and thermally conductive material.

10 18. The method of claim 17, said of electrically and thermally conductive material comprising epoxy to which traces of silver have been added.

19. The method of claim 11, with additional steps of:
depositing a layer of electrically and thermally conductive material over said anchor
posts protruding through said openings provided through said contact surfaces,
15 thereby including a surface area of said heat spreader surrounding said
openings provided through said contact surfaces, thereby using methods of
dispensing or printing; and
curing said deposited layer of electrically and thermally conductive material.

20 20. The method of claim 19, said electrically and thermally conductive material comprising a material selected from the group consisting of epoxy to which traces of silver have been added and solder paste and a solid metal.

21. The method of claim 19, with additional steps comprising molding and encapsulation processes.

25 22. A method for creating a Plastic Ball Grid Array (PBGA) package, comprising:
the steps of:

(a) providing a PBGA substrate having points of electrical contact over the surface thereof, a layer of thermally conductive adhesive having been provided over the surface of said substrate, at least one semiconductor device having been positioned over the surface of said layer of thermally conductive adhesive
30 using a die attach process, said positioning of said at least one semiconductor device being performed such that contact points provided in an active surface

of said at least one semiconductor device being exposed and facing away from the surface of said substrate, said contact points provided in an active surface of said at least one semiconductor device having been electrically connected with said points of electrical contact provided over the surface of said substrate, using methods of wire bonding;

(b) creating anchor posts over the surface of said substrate, said anchor posts being separated by a first distance;

(c) curing said created anchor posts, applying methods of in-line or snap curing;

(d) providing a heat spreader for a PBGA package, said heat spreader comprising:

(i) a horizontal portion, being parallel with the surface of said substrate of said PBGA package;

(ii) heat spreader stand-off features;

(iii) said heat spreader stand-off features having a contact surface providing contact between said heat spreader and said substrate;

(iv) said contact surface of said heat spreader stand-off features having been provided with openings there-through; and

(v) said openings provided through said contact surfaces being separated by a distance of said first distance;

(e) aligning said anchor posts provided over the surface of said substrate with said openings provided through said contact surfaces of said stand-off features of said heat spreader, using methods of pick and place; and

(f) inserting said anchor posts provided over the surface of said substrate into said openings provided through said contact surfaces of said stand-off features of said heat spreader, creating anchor posts protruding through said openings provided through said contact surfaces.

23. The method of claim 22, said anchor posts comprising deposits of thermally and electrically conductive material.

24. The method of claim 22, said anchor posts comprising a material selected from the group consisting of epoxy to which traces of silver have been added.

25. The method of claim 22, said anchor posts being created applying methods of solder bump creation.

26. The method of claim 22, said heat spreader having a first and a second surface, said first surface facing said substrate, said first surface having been provided with a layer of electrically non-conductive material.

27. The method of claim 26, said providing said first surface of said heat spreader with a layer of electrically non-conductive material comprising a method selected from the group consisting of coating and depositing and chemically treating the first surface of said heat spreader.

28. The method of claim 22, said anchor posts having been created applying methods is dispensing or printing of electrically and thermally conductive material.

29. The method of claim 28, said conductive material comprising epoxy to which traces of silver have been added.

30. The method of claim 22, with additional steps of:
depositing a layer of electrically and thermally conductive material over said anchor posts protruding through said openings provided through said contact surfaces, thereby including a surface area of said heat spreader surrounding said openings provided through said contact surfaces, thereby using methods of dispensing or printing; and
curing said deposited layer of electrically and thermally conductive material.

31. The method of claim 30, said electrically and thermally conductive material comprising epoxy to which traces of silver have been added.

32. The method of claim 30, said electrically and thermally conductive material comprising solder paste.

33. The method of claim 30, with additional steps of molding and encapsulation processes.